

## EAST Search History

L17	10694	(foamed or foam or foamable or foaming or blowing or expandable) near2 core	US-PGPUB; USPAT	OR	ON	2006/10/19 14:40
L18	12644	(osb or (strand or wafer or chip or gypsum) adj board or strandbaord or chipboard or waferbaord or gypsumboard) same17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:49
L19	12644	(osb or ((strand or wafer or chip or gypsum) adj board) or strandbaord or chipboard or waferbaord or gypsumboard) same17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:50
L20	3175	(strandbaord or chipboard or waferbaord or gypsumboard) same17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:47
L21	9967	(osb or ((strand or wafer or chip or gypsum) adj board)) same17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:46
L22	3176	(strandbaord or chipboard or waferbaord or gypsumboard) with17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:48
L23	3387	(strandboard or chipboard or waferbaord or gypsumboard) with17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:49
L24	2030	@ad<="20000101" and 23	US-PGPUB; USPAT	OR	ON	2006/10/19 14:48
L25	108	(osb or ((strand or wafer or chip or gypsum) adj board) or strandbaord or chipboard or waferbaord or gypsumboard) same 17	US-PGPUB; USPAT	OR	ON	2006/10/19 14:50
L26	71	("0919057"   "1250594"   "1474657"   "2111922"   "2875478"   "3496058"   "3557840"   "3654053"   "3692620"   "3731449"   "3753843"   "3857217"   "3911554"   "4004387"   "4024684"   "4032689"   "4037377"   "4051641"   "4068437"   "4147004"   "4169688"   "4170859"   "4283898"   "4402170"   "4430833"   "4443988"   "4471591"   "4510019"   "4514532"   "4671038"   "4704837"   "4726973"   "4765105"   "4786547"   "4802837"   "4856244"   "4865912"   "4932171"   "4961298"   "4964933"   "5058333"   "5062250"   "5081810"   "5140086"   "5194323"   "5224315"   "5269109"   "5345738"   "5428929"   "5433050"   "5497589"   "5509242"   "5519971"   "5573829"   "5628158"   "5638651"   "5641553"   "5755068"   "5842314"   "5950389"   "5953883"   "6136408"   "6240704"). PN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/19 14:53

## EAST Search History

L27	71	("0919057"   "1250594"   "1474657"   "2111922"   "2875478"   "3496058"   "3557840"   "3654053"   "3692620"   "3731449"   "3753843"   "3857217"   "3911554"   "4004387"   "4024684"   "4032689"   "4037377"   "4051641"   "4068437"   "4147004"   "4169688"   "4170859"   "4283898"   "4402170"   "4430833"   "4443988"   "4471591"   "4510019"   "4514532"   "4671038"   "4704837"   "4726973"   "4765105"   "4786547"   "4802837"   "4856244"   "4865912"   "4932171"   "4961298"   "4964933"   "5058333"   "5062250"   "5081810"   "5140086"   "5194323"   "5224315"   "5269109"   "5345738"   "5428929"   "5433050"   "5497589"   "5509242"   "5519971"   "5573829"   "5628158"   "5638651"   "5641553"   "5755068"   "5842314"   "5950389"   "5953883"   "6136408"   "6240704"). PN.	US-PGPUB; USPAT; USOCR	OR	ON	2006/10/19 14:53
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TITLE: Method of making foam coated mat online and coated mat product

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Pre-Grant Publication (PGPub) Document Number -

PGNR (1):

20030032350

### METHOD OF MAKING FOAM COATED MAT ONLINE AND COATED MAT PRODUCT

### BRIEF SUMMARY OF THE INVENTION

[0006] It is an object of the present invention to provide a foam or froth coated nonwoven fibrous mat useful as a facing on gypsum insulating board of the type described in U.S. Pat. No. 4,647,496 having one or more of improved handling characteristics, improved flame resistance, improved flexibility and product that produces less, or less irritating, dust when the faced gypsum board is cut than the mats used heretofore for facing insulating gypsum board.

[0007] It is a further object of the present invention to provide flexible mats containing a major portion of less expensive chopped glass fibers that can be used for facing gypsum wall board and other products.

[0008] It is a further object to provide a low cost method of making a foam faced fibrous non-woven mat on a wet process line without having to coat a dried mat either in-line or off-line and without having to dry the mat a second time.

[0009] The present invention includes a method of making a foam coated fibrous non-woven mat where the fibers are preferably, but not necessarily, bonded together with a conventional mat binder comprising using a wet process to form a wet non-woven web from a low concentration aqueous slurry followed by partially dewatering the mat, preferably, but not necessarily, adding an excess of aqueous foam to the partially dewatered mat, and then applying an aqueous foam from both having a high air content, and a high blow ratio, onto the top of the wet mat in-line, and then heating the mat to remove the water, and preferably to cure the binder, and set the foam coating. The aqueous foam contains a foam that breaks down fairly quickly such that the foam can be applied to the mat by spraying and the foam can penetrate the mat. The foam coating will hold the non-woven fibrous web together adequately for some applications, but it is preferred to use a conventional binder to a conventional manner to give the non-woven finished mat greater strength. The aqueous foam is foam having a blow ratio of at least 15, preferably at least 25, and most preferably at least 30, and a foam density of at least 100 lb/cu ft, and a foam peak, preferably at least 200 cps/psi, and have rapid break-up, and non-drainable characteristics.

**[0010]** The present invention also includes the mats made by the above process or a different process where the foam is applied to wet mat in-line, comprising a non-woven fibrous mat with the fibers bound together with a resinous binder and having a dry foam coating on one surface of the mat, the dry foam coating preferably being permeable to allow the mat to breathe and to allow later coatings to penetrate the foam coating. The foam layer may penetrate into the non-woven fibrous mat a distance that is a small fraction of the total thickness of the mat. This mat is very useful as a facer for many products, particularly gypsum wallboard and insulating boards of various kinds. The foam coating lies up the fibers preventing loose fibers from or fiber ends from getting on people handling and/or installing the product faced with the foam coated mat and causing irritation, odor, itching, etc. The coating the foam layer on the mat can also contain the retardant or other chemical material, a dye, colorant and/or other materials for changing the appearance or performance of the mat surface.

[0002] Fibrous non-woven mats are often formed into a wet mat from an aqueous dispersion of fibers such as glass fibers, carbon fibers, ceramic fibers, or fibers of natural and/or synthetic organic fibers that are included in the fibers such as cellulose fibers, ceramic fibers, etc. and can also include particles of inorganic material and/or plastic. Usually an solution of urea formaldehyde resin, usually modified with a thermoplastic polymer, or one of many other known resin binders is applied to a the wet non-woven web of fibers and then, after removing excess binder and water, the bindered web is dried and heated further to cure the urea formaldehyde resin or other resin binder to form a non-woven mat product. A typical process is disclosed in U.S. Pat. Nos. 4,112,174 and 3,766,003, the disclosures of which are hereby incorporated herein by reference.

[0003] The new glass mat (Gardner Manville's 7502, Mat-2, 10/100 sq. ft.) made using a binder of urea formaldehyde performed good in the process disclosed in U.S. Pat. No. 6,647,496 to make a faced insulating gypsum board, as disclosed in that patent, but the mat was not as strong as desired which caused process breakouts adding to production time. The new mat was made by the binder disclosed and made it difficult to fold around the edges of the board and also irritated the hands and arms of the workers handling and installing the insulating board product. Further, when the faced insulated gypsum board was cut, the dust from the mat was excessive and further irritated those it contacted, particularly if the workers bare arms, etc. were sweaty and the dust from the mat was irritating. The mat was also a problem for those handling the mat and the faced board when not wearing gloves and long sleeve shirts.

**000494** To address the inadequate strength problem a small portion of polyether, polyethylene terephthalate (PET), fibers were used in place of an equal amount of glass fibers and the urea formaldehyde resin binder was replaced with an acrylic binder containing a small amount of acrylated melamine. This improved the strength of the assembly and also improved the appearance of the assembly. The use of PET fibers in the resin matrix is more friendly to those handling and installing the resin or board, but the acrylic bonded mat is more expensive and less fire (flame) resistant. Such mats are disclosed in U.S. Pat. No. 5,772,846. While the mat disclosed by this latter reference have substantially improved "hand" and cause very little abrasion or discomfort in handling, the cost is still high. The use of a flame resistant mat that is disclosed in U.S. Pat. No. 5,772,846 and further improvement is still desired by some users.

[0005] There still exists a need for a nonwoven fiber glass mat that has better flame resistance, lower cost and good

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